The Impact of Evidence-based Public Health on Disparities

National Public Health Week

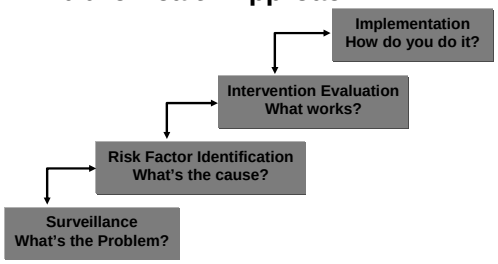
University of South Florida

April 7, 2004

1

2

Public Health Approach



3

If we did not respect the evidence, we would have very little leverage in our quest for truth

Carl Sagan

Evidence-based Public Health:

The development, implementation, and evaluation of effective programs and policies in public health through application of principles of scientific reasoning, including systematic uses of data and information systems and appropriate use of behavioral science theory and program planning models.

5

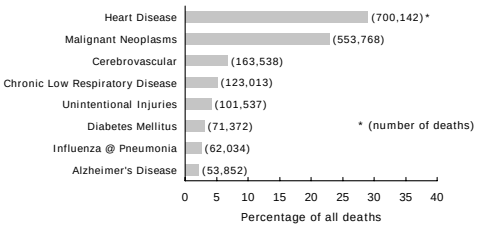
Why is Evidence-based Public Health Important?

- **During the past century, average life expectancy increased by approximately 30 years in industrialized countries**
- **Only about 5 years of that improvement is attributable to preventive services and medical care**

- Bunker et. al. 1994

6

Leading Causes of Mortality, 2001



Source: National Center for Health Statistics, National Vital Statistics Report 2003.

7

Leading Causes of Mortality by Age, 2001

Rank	<1y	1-34y	35-64y	65+y
1	Congenital Anomalies 5,513*	Unintentional Injuries 30,800	Malignant Neoplasms 503,878	Heart Disease 582,730
2	Short Gestation 4,410	Homicide 11,242	Heart Disease 137,360	Malignant Neoplasms 390,214
3	SIDS 2,234	Suicide 9,320	Unintentional Injuries 36,947	Cerebrovascular 144,486
4	Maternal Pregnancy Comp. 1,499	Malignant Neoplasms 7,126	Cerebrovascular 18,009	Chronic Low Respiratory 106,904
5	Placenta Cord Membranes 1,018	Heart Disease 4,656	Diabetes Mellitus 16,871	Influenza @ Pneumonia 55,518
6	Respiratory Distress 1,011	HIV 2,377	Liver Disease 16,345	Diabetes Mellitus 53,707

* (number of deaths)

Source: National Center for Health Statistics, National Vital Statistics Report 2003.

8

Leading Causes of Mortality by Race & Ethnicity, 2001

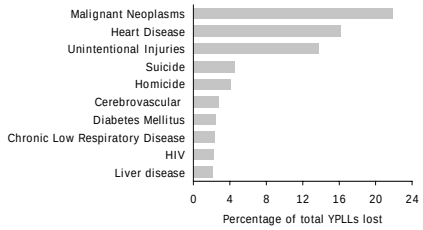
Rank	White	Black	American Indian	Asian	Hispanic
1	Heart Disease 610,638* 243.5**	Heart Disease 77,674 316.9	Heart Disease 2,402 159.6	Malignant Neoplasms 9,792 119.5	Heart Disease 27,090 192.2
2	Malignant Neoplasms 479,651 193.9	Malignant Neoplasms 62,170 243.1	Malignant Neoplasms 2,155 131.0	Heart Disease 9,428 137.6	Malignant Neoplasms 22,371 132.3
3	Cerebro vascular 140,465 55.8	Cerebro vascular 19,002 78.8	Unintentional Injuries 1,361 51.3	Cerebro vascular 3,497 51.2	Unintentional Injuries 9,523 30.7
4	Chronic Low Respiratory 113,819 45.6	Unintentional Injuries 12,462 37.6	Diabetes Mellitus 644 40.4	Unintentional Injuries 1,750 17.4	Cerebro vascular 6,416 44.9
5	Unintentional Injuries 85,964 36.0	Diabetes Mellitus 12,305 49.2	Cerebro vascular 574 41.3	Diabetes Mellitus 1,243 16.9	Diabetes Mellitus 5,663 36.7

* Number of deaths ** Age-adjusted death rates per 100,000

Source: National Center for Health Statistics, National Vital Statistics Report, 2003.

9

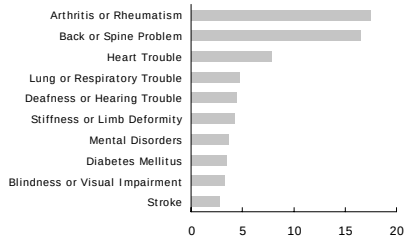
Years of Potential Life Lost Before Age 75, 2001



Source: Calculated from the National Center for Health Statistics, National Vital Statistics Report 2003.

10

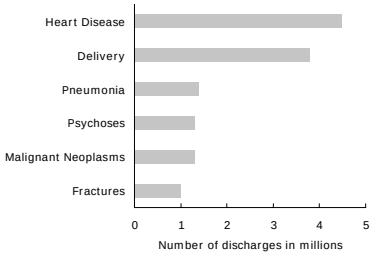
Leading Causes of Disability by Age > 18 yrs, 1999



Source: CDC. Prevalence of disabilities and associated health conditions among adults—United States, 1999. *MMWR* 2001;50:120–5.

11

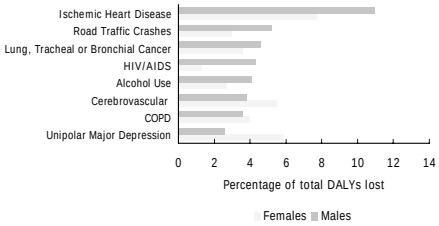
Leading Causes of Hospitalization, 1999



Source: 1999 Hospital Discharge Survey, Advance Data 2001.

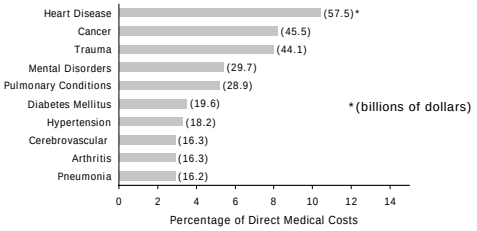
12

Disability-adjusted Life Years Lost by Gender, 1996



Source: McKenna MT, Michaud K, Murray CJL, Marks JS. Assessing the burden of disease in the United States using disability-adjusted life years. *Unpublished manuscript* 1999.

Most Expensive Conditions, 1997



Source: Cohen JW and Krauss NA. Spending and Service Use Among People With the Fifteen Most Costly Medical Conditions. *Health Affairs* 2003;22:129-138.

Based on data from the Medical Expenditure Panel Survey (MEPS)

Population Projections by Age, 2003-2050

Age	2003	2025*	2050*
	Percentages		
0-4 y	6.5	6.0	5.7
5-14 y	14.3	12.2	11.5
15-24 y	13.8	12.1	11.7
25-64 y	52.9	50.9	49.4
65-74 y	6.4	11.0	10.1
75+	6.1	7.8	11.7

Projected*

Source: Based on projections by UN World Population Prospects, The 1998 Revision.

Population Projections by Race and Ethnicity, 2000-2050

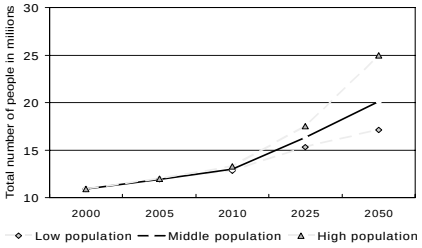
Race	2000	2020*	2050*
	Percentages		
White	71	64	53
Black	12	13	13
Hispanic	12	17	24
American Indian	0.7	0.8	0.8
Asian	4	6	9
Total Population (in millions)	275	325	404
	Projected *		

Source: Population Projections Program, Population Division, U.S. Census Bureau, Washington, DC, Internet release: January 13, 2000.
http://www.census.gov/population/www/projections/natsum-T5.html.
Last Revised: August 02, 2002.

Projections of Alzheimer's Disease Prevalence, 1997-2047

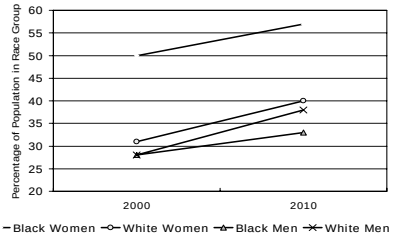
Source: Brookmeyer, et al. "Projections of Alzheimer's disease in the United States and the public health impact of delaying disease onset. *American Journal of Public Health* 88(9), 1337-1342 1998

Projections of Total Number of People with Diagnosed Diabetes, 2000-2050



Source: Boyle JP, Honeycutt AA, Venkat Narayan KM, Hoerger TJ, Geiss LS, Chen H, Thomson TJ. Projections of Diabetes Burden Through 2050. *Diabetes Care* 2001;24: 1936-1940.

Projections of Total Number of People with Obesity, 2000-2010



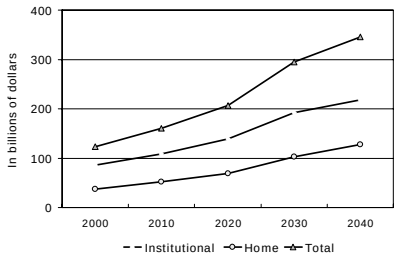
Source: Roux L, Yore MM Obesity Prevalence in 2010: Will we reach our target? *Unpublished Manuscript* 2003

19

Surgery for Severe Obesity: U.S. 1992 to 2003 NEJM March 11, 2004

20

Projections of Long-term Care Expenditures for the Elderly, 2000-2040



Source: Projections of Expenditures for Long-term Care Services for the Elderly, Congressional Budget Office 1999.

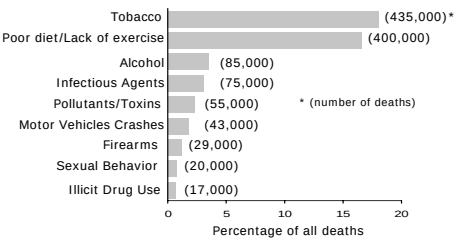
21

Public health workers, … deserve to get somewhere by design, not just by perseverance.

(McKinlay and Marceau, AJPH January, 2000)

22

Actual Causes of Death, 2000



Source: Mokdad AH, Marks JS, Stroup DF, and Gerberding JL. Actual Causes of death in the United States, 2000. (*JAMA* 2004;291:1238-45)

23

Key Differences between Evidence-Based Medicine and Evidence-Based Public Health

Characteristic	Evidence-Based Medicine	Evidence-Based Public Health
Quality of evidence	Experimental studies	Observational and quasi-experimental studies
Volume of evidence	Larger	Smaller
Time from intervention to outcome	Shorter	Longer
Professional training	More formal, with certification and /or licensing	Less formal, no standard certification
Decision making	Individual	Team

24

Why Systematic Reviews?

In principle, scientifically credible reviews might help to translate the best available research into more effective practice

25

Far Fewer Systematic Reviews Exist for Public Health than for Clinical Practice

- Compares to thousands of clinical reviews
- A recent (2003) scoping exercise by members of the Cochrane Collaboration Health Promotion and Public Health Field identified
  - 142 reviews
  - 105 protocols
  - 66 (pre-protocol stage)

26

Some Experts Would Focus on the Randomized Trial

- Best available tool for reducing measured and unmeasured confounding
- Unique strengths in supporting causal inference
- Might increase efficiency of searching
- Understandable
- May be easier to synthesize than diverse designs

27

The Most Contentious Question In Systematic Reviews?

The effectiveness of parachutes has not been subjected to rigorous evaluation by using randomized controlled trials....

Smith and Pell, BMJ, 2004

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

28

Rationales for Alternatives or Supplements to the Randomized Controlled Trial

- Randomization often not appropriate or feasible
- Randomized studies are not free of threats to internal and especially external validity
- Several recent systematic comparisons show close correlation between randomized and "observational" studies
  - Britton et al 1998
  - Concato et al, 2000
  - Benson and Hartz, 2000
  - Ioannidis et al, 2001

29

Sometimes, RCTs Are More Reliable Than "Observational Data"

- Trials on estrogen replacement therapy and cardiovascular disease have raised important questions about earlier observational studies

30

Sometimes, "Observational Data" Are More Reliable Than RCTs

- RCTs often underestimate drug-related harms and observational data (e.g., from well-conducted cohort studies) are preferable to (underpowered or too short term) RCTs

31

External Validity Deserves More Attention

- Some of the same issues that enhance internal validity probably reduce external validity
  - Tight control
  - Volunteer samples
  - Regimented approach
- How to strike the right balance?

32

Where To Set The Evidentiary Bar For Effectiveness?

- How much evidence is enough?
- How to balance Type 1 vs. Type 2 error?

"The scientific purist, who will wait for medical statistics until they are … exact, is no wiser than Horace's rustic waiting for the river to flow away."

Major Greenwood

33

Both Systematic Reviews and Evidence-based Recommendations Reflect Choices and Tradeoffs…

- Methods and process choices are to some extent arbitrary
- Lots of sensible choices
- Results will frequently vary with these choices
- Object is to document choices so that users can assess credibility

34

Community Guide Basics

- DHHS initiative
- CDC coordination and support
- Collaboration among public and private partners
- Independent, non-federal oversight
  - The Task Force on Community Preventive Services

35

What is the Community Guide?

- Systematic reviews
- Evidence-based recommendations
- Gaps in evidence / Areas for further study
- Catalyst for public health collaboration
- Credible resource for effective population-based approaches across health topics

36

What Is Being Reviewed in the Community Guide?

Risk Behaviors	Specific Conditions
• Tobacco Use • Alcohol Abuse / Misuse • Other Substance Abuse • Poor Nutrition • Inadequate Physical Activity • Unhealthy Sexual Behaviors	• Vaccine Preventable Disease • Pregnancy Outcomes • Violence • Motor Vehicle Injuries • Depression • Cancer • Diabetes • Oral Health
The Environment	
• Social Environment	

37

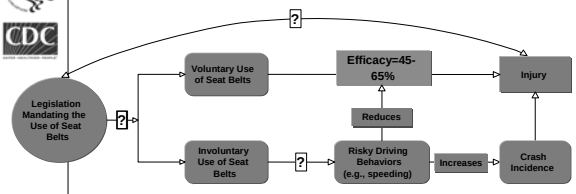
What Kinds of Interventions are Addressed in the Community Guide?

- Increasing availability of services
  - Worksite vaccination
- Healthcare system changes
  - Provider reminders
- Laws and policies
  - Child safety seat laws
- Environmental changes to improve health
  - Creating walking / biking trails

38

Legislation Mandating the Use of Seat Belts: Analytic Framework

Hypothesized links between laws and possible outcomes



39

Suitability of Study Design

- Greatest
  - Prospective and
  - Concurrent comparison
- Moderate
  - Retrospective or
  - Multiple measurements over time; no concurrent comparison
- Least
  - Single before and after measurement; no concurrent comparison or
  - Exposure and outcome measured at single point in time

40

Strength of Study Execution

- Description
  - Population
  - Intervention
- Sampling
- Measurement
  - Exposure
  - Outcome
- Analysis
- Interpretation of results
- Other

41

Synthesizing Results

- No combination
- Narrative summary
- Simple quantitative summary
- Formal meta-analysis

42

Using Scientific Evidence to Support Decision Making

- How to incorporate information other than effectiveness?
  - Applicability
  - Harms
  - Costs

43

Do Systematic Reviews + Active Dissemination Efforts Affect Practice?

- Recent anecdotes
  - .08 Laws
  - Tobacco control

44

Conflicting Results and Recommendations

- Rules of evidence matter including:
  - Comprehensive vs. Selective review
  - Health vs. Intermediate Outcomes
- Weight given to non-effectiveness issues e.g., Harms or costs
- Threshold for positive recommendations

45

Issues in Promoting Understanding

- Insufficient evidence is still widely misunderstood as evidence that interventions do not work
- Still much that needs to be done about what to say about interventions that haven't undergone good evaluations

46

Still Much Room to Improve Awareness and Impact

- Many professionals are unaware of available evidence
- Some who are aware don't use it
- Failing to use effective interventions can adversely affect fulfilling mission and getting public support

47

Target Audiences

- Public health departments and other health practitioners
- Decision and policy makers
- Healthcare delivery systems
- Insurers of care
- Purchasers of health services
- Foundations
- Community organizations
- Academia

48

Other Issues in Promoting Evidence Translation

- How to speed up adoption including better understanding of key barriers
- How, whether, and when to tailor dissemination activities
- More info on importance of evidence to decision makers and how to move it higher on the list
- More information on what information other than effectiveness is critical to decision makers

49

Current Status - 2004

- 162 reviews approved by the Task Force
- 90 reviews published
- book published in November
- Posting web while awaiting publication (cancer screening)
- Joint release with USPSTF on skin cancer

50

Recommendations Summary

- 162 recommendations
- 75 recommended
  - 42 strong
  - 33 sufficient
- 2 not recommended
- 86 insufficient evidence

51

How Do I Find It?

- Publications
  - MMWR Reports & Recommendations (R&R) series
  - American Journal of Preventive Medicine
- Website
  - www.thecommunityguide.org

52

Recommendations for Minority Populations

- None limited to minorities, but
- Most evaluations in diverse populations
- Absolute benefit if prevalence higher in minority populations, still
- Limited primary research on effectiveness

53

…increasingly the medical community is making evidence-based medicine the standard….much of what we had accepted as good clinical practice [has not] stood up to scrutiny….The Guide to Community Preventive Services brings public health to the same level of scrutiny….

McGinnis and Foege, 2000

54